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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,248	06/27/2001	Masatsugu Suwabe	09792909-5087	1879

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EXAMINER	
UHLIR, NIKOLAS J	
ART UNIT	PAPER NUMBER
1773	4

DATE MAILED: 04/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/893,248	Applicant(s) SUWABE, MASATSUGU	
	Examiner Nikolas J. Uhlir	Art Unit 1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) *5-8* is/are withdrawn from consideration.

5)☐ Claim(s) *none* is/are allowed.

6)☒ Claim(s) *1-4* is/are rejected.

7)☐ Claim(s) *none* is/are objected to.

8)☐ Claim(s) *none* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 1-4 in Paper No. 3 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimazaki et al. (US5637411) in view of Aratani et al. (US5018119).

5. The limitations of claims 1 and 2 require a magnetically induced super resolution (hereafter MSR) type magneto-optical recording medium comprising, on a light transmitting substrate, at least a recording layer for recording and retaining information therein, and a readout layer for copying therein the information retained in the recording layer during reproduction of the information, and a read out auxiliary layer, wherein: an exchange-coupling breaking layer is dispersed between said read out auxiliary and the

recording layer, and said exchange coupling breaking layer comprises a layer of a nitride of either GdFeCo or TbFeCo.

6. Regarding these limitations, Shimazaki et al. (hereafter Shimazaki) teaches an MSR type magneto-optical recording medium that comprises a transparent substrate 1, and magnetic layers 4a, 4b and 4c disposed on the transparent substrate as shown by figure 46. Magnetic layer 4a is formed from GdFeCo, magnetic layer 4b is formed from TbFeCoNb, and magnetic layer 4c is formed from TbFeCo (column 38-lines 1-19). While Shimazaki does not specifically teach the functions of the three layers (i.e recording, reproducing etc..) It is noted that Shimazaki teaches that the three layer media is similar to that disclosed by JP01-143042 (application #62-301922) (see column 11, lines 40-50). US patent #5018119 claims priority to this Japanese document, and so is taken to be equivalent to the Japanese reference cited by Shimazaki. Aratani teaches a MSR medium having similar structure that formed from similar materials as that of Shimazaki. Specifically, Aratani teaches a transparent substrate coated with 3 magnetic layers, wherein the first magnetic layer is a reproducing layer, the second magnetic layer is a reproducing auxiliary layer, and the third layer is a recording layer, as shown by figure 1 and discussed at column 3, lines 35-62 and column 7, "example." Thus, as the medium disclosed by Shimazaki is similar in structure and composition to that disclosed by Aratani, the examiner takes the position that the 1st magnetic layer 4a of Shimazki is a reproducing layer, the 2nd magnetic layer 4b is a reproducing auxiliary layer, and the third magnetic layer is a recording layer, thus meeting the limitations of claim 1 and 2

7. Shimazaki further teaches that the external magnetic field sensitivity of a MSR type magneto-optic recording medium that utilizes three layers (as in the example shown by figure 46), can be improved by forming an oxide or a nitride of a rare earth transition metal alloy on the surface of at least one of the three magnetic films. This oxide or nitride is specifically taught to be formed by heat-treating any desired magnetic film in a vacuum chamber containing a controlled amount of oxygen or nitrogen (column 11, lines 40-column 12, line 10). It is noted that this method is very similar if not identical to that utilized by the applicant in the instant specification for forming the nitride films. Thus, it is clear that the nitride or the oxide film formed will be an oxide or a nitride of the alloy that comprises the magnetic layer that is heated in the nitrogen or oxygen-containing atmosphere.

8. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to form an nitride film per the method disclosed by Shimazaki between the first magnetic layer 4a (GdFeCo) and the second magnetic layer 4b (TbFeCoNb) disclosed by figure 46.

9. One would have been motivated to form the nitride layer due to the teaching in Shimazaki that the external magnetic field sensitivity of the medium is improved by forming a nitride layer on the surface of one of the three films. One would have chosen to form a nitride as opposed to an oxide in lieu of the fact that Shimazaki recognizes the equivalence of nitrides and oxides for this purpose. Further, One would have specifically placed the nitride layer between the magnetic layer 4a and the magnetic layer 4b due to the teaching in Shimazaki that the external magnetic field sensitivity can be improved by

forming an oxide or nitride layer on at least one of the surfaces of the magnetic layers. Thus, Shimazaki effectively teaches forming an oxide or nitride layer at the interface between the 1st and 2nd magnetic layers, the 2nd and 3rd magnetic layers, or on the surface of the 3rd magnetic layer opposite the interface of the 2nd and 3rd magnetic layer is effective for improving the external magnetic field sensitivity. Thus, Shimazaki recognizes the equivalence of forming a nitride layer between the 1st and 2nd layers to forming the nitride layer between the 2nd and third magnetic layer or on the surface of the 3rd magnetic layer opposite the interface of the 2nd and 3rd layers.

10. Regarding the requirement that the nitride be a nitride of GdFeCo or TbFeCo. In lieu of the fact that the method of Shimazaki teaches forming the nitride film by heating a desired magnetic layer in an atmosphere of nitrogen as stated above, it is clear that the nitride formed will be a nitride of the alloy composition making up the magnetic layer. Thus, in the embodiment shown by figure 46, when a nitride film is formed between the 2nd (TbFeCoNb) magnetic layer and the 3rd (TbFeCo) magnetic layer, the method would heat the TbFeCoNb 2nd magnetic layer in a nitrogen-containing atmosphere, thus resulting in the nitride comprising a nitride of TbFeCoNb. Thus, the limitations of claims 1 and 2 are met.

11. Regarding the limitations of claims 3 and 4, wherein the applicant requires the nitride film to be between 1 atom layer thick and 100 angstroms thick. The examiner acknowledges that neither Shimazaki nor Aratani teaches this specific thickness. However, it is well known in the art that the thickness of a nitride film formed by heating a metal film in an atmosphere of nitrogen is regulated by the amount of time the film is

allowed to reside in the heated atmosphere of nitrogen as well as the amount of nitrogen utilized in the atmosphere, with thicker nitride films being formed when the film is exposed for a longer period of time or to a higher nitrogen concentration, and vice versa. It is further noted that thicker films would have different dielectric characteristics and would require more materials and thus cost more then thinner materials.

12. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to control the nitridation parameters such as exposure time and nitrogen concentration in order to control the thickness of the nitride film disclosed by Shimazaki to a desired value.

13. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimazaki in view of Aratani as applied to claim 1 above, and further in view of Nishimura et al. US5717662.

14. In addition to the arguments set forth above regarding the thickness limitation of claims 3 and 4, Nishimura teaches a magneto-optical recording medium that utilizes a oxide or nitride intermediate layer between the reocridng layer and reproducing layer (column 3, lines 15-23). The intermediate layer is formed from an oxide or a nitride, and controls the amount of magnetostatic and exchange coupling that occurs between the recording and reproducing layers (column 6, lines 15-20). In particular, Nishimura teaches that the amount of magnetostatic coupling between the recording and reproducing layers varies inversely with the thickness of the intermediate layer (column 8, lines 1-2).

15. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to control the thickness of the nitride film utilized by Shimazaki in view of Arakani to a desired value in order to obtain a desired level of magnetostatic coupling between the recording and reproducing layers in the medium.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhlir whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.

nju
April 10, 2003

Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700